MEMORANDUM FOR: DCI
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25 Mar

This is FYI.

I picked up a copy of a speech by Secretary Shultz on Wednesday (copy attached). Of particular interest is the reference to chemical weapons proliferation on pages 18-19; in particular, the point on page 19 about improved intelligence.

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SCIENCE AND AMERICAN FOREIGN POLICY:

THE SPIRIT OF PROGRESS

ADDRESS BY

THE HONORABLE GEORGE P. SHULTZ

SECRETARY OF STATE

TO THE

NATIONAL ACADEMY OF SCIENCES

WASHINGTON, D.C.

MARCH 6, 1985

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Soon after the dawn of the nuclear age, Albert Einstein observed that everything had changed except our modes of thinking. Even so dramatic a development as the nuclear revolution took a long time to be fully understood. In recent decades, the world has seen other extraordinary advances in science and technology -- advances that may be of even more pervasive importance and that touch every aspect of our lives. In so many of these areas, the pace of change has been faster than our ability to grasp its ramifications. There have even been moments when our mood was more one of fear than of hope.

In the 1970s, many were preoccupied with the idea that ours was a small planet and getting smaller, that natural resources were limited and were being depleted, that there were inescapable limits to growth. Food would run out; forests would disappear; clean water would be scarce; energy sources would vanish. There was, in short, a deep pessimism about the future of our planet and of mankind itself.

Fortunately, that spirit of pessimism has been replaced in recent years by a new spirit of progress. More and more, we are returning to the belief traditionally held by post-Enlightenment societies: that the advance of science is something to be welcomed and encouraged, because it multiplies our possibilities faster than it adds to our problems.

More and more, we see that unleashing the vast potential of human ingenuity, creativity, and industriousness is itself the key to a better future. Science and technology cannot solve all our problems, but the experience of recent years reminds us that they can alleviate wide areas of human suffering and make a better life possible for millions around the world. We can only imagine what they might achieve in the decades to come.

When I was at MIT, I knew an economist at Harvard who had an uncanny knack for making accurate predictions. I always wondered about the secret of his forecasting ability, and when he died, someone going through his papers found part of the explanation. He had written that he was more successful at economic predictions than others because he was "an optimist about America," a trait he attributed to two things: his origins in the Midwest, "where the future is more important than the past," and the fact that he grew up in a family of scientists and engineers, forever "discovering" and "doing" new things.

Optimism alone will not be enough to carry us through the difficult times that lie ahead, and mindless optimism would be as foolish as the mindless pessimism of years past.

The scientific and technological revolutions taking place all around us offer many great opportunities, but they also present many challenges -- challenges that come from the need to make choices, challenges that lie at the intersection of science and politics, and perhaps most important, challenges to our ways of thinking about ourselves and our world.

Dilemmas and Choices

The revolutions in science and technology have opened up seemingly limitless possibilities for transforming our world. With each new breakthrough, however, come new and difficult dilemmas. For while we may seek ways to change the world around us, there is also much we would like to preserve. Our civilization is not based on material things. Our culture, our moral values, and our political ideals are treasures that we would not sacrifice even for the most amazing scientific miracle.

Breakthroughs in biological engineering, for instance, raise fundamental moral questions about man's proper role in the creation and alteration of life, even as they offer new hope to cure diseases, produce food, and broaden our understanding of the origins of life.

We need to be concerned about the dangers to our environment that may accompany some new technologies, even while recognizing that other new technologies may be the source of solutions to these problems. We need to ensure that the revolution in communications does not infringe on our right to privacy, even while recognizing the enormous benefits of improved communication for education and for bringing the world closer together. This is the human condition: the creativity that is one part of our nature poses constant challenges to the morality that is another part of our nature. There is no final resting place, no permanent solution -- only a continuing responsibility to face up to these hard dilemmas.

We also face some difficult practical choices, and as societies we address them through our political process. Scientific research and development, for example, require financial support. Where should that support come from? And what should be supported? The United States will invest some $110 billion in scientific research and development next year -- more than Japan, France, West Germany, and the United Kingdom combined. Of that amount, nearly half comes from the federal government. That is a large investment, taken by democratic process from the American taxpayer. But it reflects a choice we have all made to support scientific progress.

It reflects our understanding that scientific advance serves everyone in our society -- by improving health and the quality of life, by expanding our economy, by enhancing the competitiveness of our industries in the world market, by improving our defenses, and perhaps most important, simply by pushing back the frontiers of knowledge.

Yet we have also learned that government can become too involved, that government bureaucracies are not always the best judges of where such money can most usefully be spent. Today, private industry, not government, is pushing hardest at the technological frontiers in many fields -- in electronics and biotechnology, to name just two.

The problem, then, is to discover how government support for science and technology can best serve the broad goals of society. In the field of basic research, for example, we cannot always count on the profit motive to foster progress in those areas where research may not lead to the development of marketable products for many years. Government support for basic research gives learning and the pursuit of knowledge a chance to proceed without undergoing the rigorous test of the market place.

One particularly worthy recipient of government support, therefore, is the university. The unfettered process of learning and discovery that takes place mainly in academia is vital. From the university comes the fundamental knowledge that ultimately drives innovation. And from the university comes the pool of creative and technically proficient young men and women who can use that knowledge and apply it to practical problems. The Reagan Administration recognizes the importance of this; since 1981, support for basic research at universities has grown by nearly 30 percent.

Even so, the government has limited funds, and further choices have to be made about which projects to support and which to cut back. Government, universities, and the private sector have to work together to make these difficult but inescapable decisions. We as a society cannot afford to turn away from the challenge of choosing.

Science and Politics

These are not the only hard choices that have to be confronted at the intersection of science and politics. Scientific advances have increasingly become the focus of political debate. Today, scientific questions, and scientists themselves, play a prominent role in the political arena.

On a wide variety of complex issues the American people look to scientists as an important source of information and guidance. In a nation like ours, where knowledge is valued and the search for truth is considered among the noblest of human endeavors, the scientist naturally and properly commands great respect. With that respect, however, comes responsibility.

Too often in recent years we have seen scientists with well-deserved reputations for creative achievement and intellectual brilliance speaking out on behalf of political ideas that unfortunately are neither responsible nor particularly brilliant.

It is not surprising that scientists will have strong views on such technically complex matters as nuclear weapons, arms control, and national defense. But the core issues in dispute here are really not technical, but political and moral. Scientists should not expect their words to have special authority in non-scientific areas where they are, in fact, laymen. Scientists are not specialists in the field of world politics, or history, or social policy, or military doctrine. As citizens of a free society, they have every right to take part in the public debate. But they have no special claim to infallibility.

Challenges to Our Ways of Thinking

The great intellectual adventure of the scientific revolution beckons all of us -- scientists, government leaders, and all Americans -- to march ahead together. In collaboration we can achieve a better and deeper understanding of these new developments and what they portend. The changes occurring all around us have far-reaching implications not only for our personal lives, but also for the conduct of our foreign policy, for national security, and indeed for the very structure of the international order. And as we confront these changes, we must heed Einstein's observation: Perhaps the greatest challenges we face are to our ways of thinking.

The Age of Information Technology. -- One of the most revolutionary recent developments is what Walter Wriston has called "the onrushing age of information technology." The combination of microchip computers, advanced telecommunications -- and a continuing process of innovation -- is not only transforming communication and other aspects of daily life, but is also challenging the very concepts of national sovereignty and the role of government in society.

The implications of this revolution are not only economic. First of all, the very existence of these new technologies is yet another testimony to the crucial importance of entrepreneurship -- and government policies that give free rein to entrepreneurship -- as the wellspring of technological creativity and economic growth. The closed societies of the East are likely to fall far behind in these areas -- and Western societies that maintain too many restrictions on economic activity run the same risk.

Second, any government that resorts to heavy-handed measures to control or regulate or tax the flow of electronic information will find itself stifling the growth of the world economy as well as its own progress. This is one of the reasons why the United States is pressing for a new round of trade negotiations in these service fields, to break down barriers to the free flow of knowledge across borders.

For two years the Organization of Economic Cooperation and Development has been considering an American initiative for a common approach to this problem. Today we are very close to obtaining a joint statement by OECD governments pledging themselves to:

-- maintain and promote unhindered circulation of data and information,
-- avoid creating barriers to information flows, and
-- cooperate and consult to further these goals.

Even here there are dilemmas, however. Government efforts to prevent the copywriting of computer software only reduce incentives for developing new types of software and inhibit progress. We need to understand clearly the crucial difference between promoting the flow of information and blocking innovation. The entire free world has a stake in building a more open system, because together we can progress faster and farther than any of us can alone.

This points to another advantage the West enjoys. The free flow of information is inherently compatible with our political system and values. The Communist states, in contrast, fear this information explosion perhaps even more than they fear Western military strength. If knowledge is power, then the communications revolution threatens to undermine their most important monopoly -- their effort to stifle their people's information, thought, and independence of judgment. We all remember the power of the Ayatollah's message disseminated on tape cassettes in Iran; what could have a more profound impact in the Soviet bloc than similar cassettes, outside radio broadcasting, direct broadcast satellites, personal computers, or xerox machines?

Totalitarian societies face a dilemma: Either they try to stifle these technologies and thereby fall further behind in the new industrial revolution, or else they permit these technologies and see their totalitarian control inevitably eroded. In fact, they do not have a choice, because they will never be able entirely to block the tide of technological advance.

The revolution in global communication thus forces all nations to reconsider traditional ways of thinking about national sovereignty. We are reminded anew of the world's interdependence, and we are reminded as well that only a world of spreading freedom is compatible with human and technological progress.

The Evolution of Strategic Defense. -- Another striking example of the impact of scientific and technological change is the issue of strategic defense. Here the great challenge to us is not simply to achieve scientific and engineering breakthroughs. As real a difficulty is to come to grips with "our ways of thinking" about strategic matters in the face of technical change.

For decades, standard strategic doctrine in the West has ultimately relied on the balance of terror -- the confrontation of offensive arsenals by which the two sides threaten each other with mass extermination. Deterrence has worked under these conditions and we should not abandon what works until we know that something better is genuinely available. Nevertheless, for political, strategic, and even moral reasons, we owe it to ourselves and to future generations to explore the new possibilities that offer hope for strategic defense, that could minimize the dangers and destructiveness of nuclear war. If such technologies can be discovered, and the promise is certainly there, then we will be in a position to do better than the conventional wisdom which holds that our defense strategy must rely on solely offensive threats and must leave our people and our military capability unprotected against attack.

Adapting our ways of thinking is never an easy process. The vehemence of some of the criticism of the President's Strategic Defense Initiative seems to come less from the debate over technical feasibility -- which future research will settle one way or another in an objective manner -- than from the passionate defense of orthodox doctrine in the face of changing strategic realities.

We are proceeding with SDI research because we see a positive, and indeed revolutionary potential: Defensive measures may become available that could render obsolete the threat of an offensive first strike. A new strategic equilibrium based on defensive technologies and sharply reduced offensive deployments is likely to be the most stable and secure arrangement of all.

Science and Foreign Policy

These are but two examples of how technological advances affect our foreign policy. There are many others. It is in our national interest, for example, to help other countries achieve the kinds of technological progress that hold such promise for improving the quality of life for all the world's people. The expansion of the global economy, and new possibilities of international cooperation, are among the benefits that lie ahead of us as technical skills grow around the world.

Therefore, cooperation in the fields of science and technology plays an increasing role in our relations with a range of countries. We have important cooperative links with China and India, for example, as well as with many other nations in the developing world.

We are working with nations in Asia, Latin America, and Africa to achieve breakthroughs in dryland agriculture and livestock production to help ease food shortages, or in medicine and public health to combat the scourge of disease. Our scientific relations with the industrialized nations of Western Europe and Japan aim at breaking down barriers to the transfer of technological knowhow.

Clearly, our science and technology relationships with other industrialized nations are not without problems. There is, in fact, a permanent tension between our desire to share technological advances and our equally strong desire to see American products compete effectively in the international market. We cannot resolve this dilemma, nor should we. The interplay between the advancement of knowledge and competition is productive. Some nations may focus their efforts too heavily on competition at the expense of the spread of knowledge that can benefit everyone, and certainly we in the United States should not be alone in supporting basic scientific research. The industrialized nations should work together to strike a balance that can promote the essential sharing of scientific advances and at the same time stimulate the competitive spirit which itself makes such an important contribution to technological progress.

Technology Transfer

A further dilemma arises where new technologies may have military applications. We maintain a science and technology relationship with the Soviet Union, for instance, even though we must work to ensure that the technologies we share with the Soviets cannot be used to threaten Western security.

The innovations of high technology are obviously a boon to all nations that put them to productive use for the benefit of their peoples. But in some societies, it often seems that the people are the last to get these benefits. The Soviet Union has for decades sought to gain access, through one means or another, to the technological miracles taking place throughout the free world. And one of their goals has been to use these new technologies to advance their political aims -- to build better weapons, not better health care; better means of surveillance, not better telephone systems.

This, of course, poses another dilemma. We seek an open world, where technological advances and knowhow can cross borders freely. We welcome cooperation with the Soviet Union in science and technology.

And yet in the world as it exists today, the West has no choice but to take precautions with technologies that have military applications. Cooperation with our allies is essential. Countries that receive sensitive technologies from the United States must maintain the proper controls to prevent them from falling into the hands of our adversaries.

Scientists can help us think through this difficult problem. What technologies can be safely transferred? How do we safeguard against the transfer of technologies that have dual uses? Where do we strike the balance?

The Proliferation of Nuclear and Chemical Weapons

And scientists can also be helpful in other areas where the free flow of technical knowledge poses dangers. One priority goal of our foreign policy, for instance, is to strengthen international controls over two of the grimmer products of modern technology: weapons of mass destruction, both nuclear and chemical.

The world community's success or failure in preventing the spread of nuclear weapons will have a direct impact on the prospects for arms control and disarmament, on the development of nuclear energy for peaceful purposes, and indeed on the prospects for peace on this planet. The United States pursues the goal of non-proliferation through many avenues:

-- We have long been the leader of an international effort to establish a regime of institutional arrangements, legal commitments, and technological safeguards against the spread of nuclear weapons capabilities. We take an active part in such multilateral agencies as the International Atomic Energy Agency, the Nuclear Energy Agency, and International Energy Agency.

-- Although we have major differences with the Soviet Union on many arms control issues, we have a broad common interest in nuclear non-proliferation. In the fall of 1982, Foreign Minister Gromyko and I agreed to initiate bilateral consultations on this problem; since then, several rounds of useful discussions have taken place, with both sides finding more areas of agreement than of disagreement.

-- This year, the United States will sit down with the 126 other parties to the Non-Proliferation Treaty for the third time in a major review conference. We will stress the overarching significance of the Treaty, its contribution to world peace and security, and the reasons why it is in every nation's fundamental interest to work for universal adherence to it.

The progress in nuclear non-proliferation has unfortunately not been matched in the area of chemical weapons. The sad fact is that a half century of widely accepted international restraint on the use or development of chemical weapons is in danger of breaking down. In 1963, we estimated that only five countries possessed these weapons. Now, we estimate that at least thirteen countries have them, and more are trying to get them. As we have seen, the problem has become particularly acute in the war in the Persian Gulf.

We have had some marked success in limiting the spread of nuclear weapons in part because the world community has worked together to raise awareness and to devise concrete measures for dealing with the problem. We must do the same in the field of chemical weapons. It will not be an easy task. Chemical industries and dual-use chemicals are more numerous than their counterparts in the nuclear field, and chemical weapons involve lower levels of technology and cost less than nuclear weapons. But the effort must be made:

-- First, we need to raise international awareness that there is a growing problem and that developed nations, in particular, have a special obligation to help control the spread of chemical weapons.

-- Second, we need to expand and improve our intelligence capabilities and provide for greater coordination between intelligence services and policymakers in all countries.

-- And third, we must take both bilateral and multilateral actions to deal with problem countries and to curb exports of materials that can be used in the manufacture of chemical weapons.

The scientific community can help in a variety of ways. Chemical engineers can help us identify those items that are essential to the manufacture of chemical weapons and then determine which countries possess them, so that we can promote more effective international cooperation. Scientists can help us find better ways to check the flow of the most critical items without overly inhibiting the transfer of information and products that serve so many beneficial purposes around the world.

These are difficult problems, but if we work together we can begin to find better answers.

The Vision of a Hopeful Future

I want to end, as I began, on a note of hope. If we confront these tough issues with wisdom and responsibility, the future holds great promise. President Reagan, in his State of the Union message last month, reminded us all of the important lesson we should have learned by now: "There are no constraints on the human mind, no walls around the human spirit, no barriers to our progress except those we ourselves erect." Today we see this fundamental truth being borne out again in China, where a bold new experiment in openness and individual incentives is beginning to liberate the energies of a billion talented people. The Chinese have realized that farm productivity is not merely a matter of scientific breakthroughs; it is also a matter of organization and human motivation.

The technological revolution is pushing back all the frontiers on earth, in the oceans, and in space. While we cannot expect these advances to solve all the world's problems, neither can we any longer speak in Malthusian terms of inevitable shortages of food, energy, forests, or clean air and water. In the decades ahead, science may find new ways to feed the world's poor -- already we can only look in wonder at how increased farm productivity has made it possible for a small percentage of Americans to produce enough food for a significant portion of the world's people.

We may discover new sources of energy and learn how to use existing sources more effectively -- already we see that past predictions of energy scarcity were greatly exaggerated. We may see new breakthroughs in transportation and communication technologies, which will inevitably bring the world closer together -- think back on the state of these technologies forty years ago, and imagine what will be possible forty years hence.

Change -- and progress -- will be constant so long we maintain an open society where men and women are free to think, to explore, to dream, and to transform their dreams into reality. We would have it no other way. And in a society devoted to the good of all, a society based on the fundamental understanding that the free pursuit of individual happiness can benefit everyone, we can have confidence that the products of science will be put to beneficial uses, if we remain true to our heritage and our ideals.

Therefore, we retain our faith in the promise of progress. Americans have always relished innovation; we have always embraced the future. As President Reagan put it, we must have a "vision that sees tomorrow's dreams in the learning and hard work we do today."